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Docket No.: 4101-0206-0X

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12/6/01

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ASSISTANT COMMISSIONER FOR PATENTS
WASHINGTON, D.C. 20231

RE: Application Serial No.: 09/129,238
Applicants: Veronique SARDOY et al.
Filing Date: AUGUST 5, 1998
For: PROCESS FOR PRODUCING A THIN SHEET OF ULTRA-LOW-CARBON STEEL FOR THE MANUFACTURE OF DRAWN PRODUCTS FOR PACKAGING AND THIN SHEET OBTAINED
Group Art Unit: 1742
Examiner: YEE

SIR:

Attached hereto for filing are the following papers:

Appeal Brief w/Attached Appendix I (in triplicate)

Our check in the amount of $320.00 is attached covering any required fees. In the event any variance exists between the amount enclosed and the Patent Office charges for filing the above-noted documents, including any fees required under 37 C.F.R 1.136 for any necessary Extension of Time to make the filing of the attached documents timely, please charge or credit the difference to our Deposit Account No. 15-0030. Further, if these papers are not considered timely filed, then a petition is hereby made under 37 C.F.R. 1.136 for the necessary extension of time. A duplicate copy of this sheet is enclosed.

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Respectfully submitted,

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4101-0206-0X

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF: :

VERONIQUE SARDOY ET AL : EXAMINER: YEE

SERIAL NO: 09/129,238 :

FILED: AUGUST 5, 1998 : GROUP ART UNIT: 1742

FOR: PROCESS FOR PRODUCING A THIN SHEET OF ULTRA-LOW-CARBON STEEL FOR THE MANUFACTURE OF DRAWN PRODUCTS FOR PACKAGING AND THIN SHEET OBTAINED

APPEAL BRIEF

ASSISTANT COMMISSIONER FOR PATENTS
WASHINGTON, D.C. 20231

SIR:

Appellants appeal the Final Rejection of Claims 8-17, 19-21 and 23 of the above-identified application set forth in the Official Action dated June 11, 2001.

I. REAL PARTY IN INTEREST

The real party in interest in Sollac of Puteaux, France by virtue of the Assignment executed August 12, 1998. The executed Assignment was forwarded to the U.S. Patent and Trademark Office on October 13, 1998 for recordation.

II. RELATED APPEALS AND INTERFERENCES

To the best of Applicants' undersigned representative's knowledge, there are no related appeals or interferences.

III. STATUS OF CLAIMS

Claims 20 and 23 are withdrawn from the appeal, leaving Claims 8-17, 19 and 21 on appeal.

IV. STATUS OF AMENDMENTS

No amendment was proposed and no request for reconsideration was submitted in response to the Final Rejection mailed June 11, 2001.

V. SUMMARY OF INVENTION

The present invention involves a process for producing a thin sheet of ultra-low-carbon steel and the sheet produced, by providing a killed and vacuum-degassed steel having, by weight, between 0.10 and 0.35% manganese, less than 0.006% nitrogen, less than 0.025% phosphorus, less than 0.020% sulfur, less than 0.020% silicon, a total amount of the elements copper, nickel and chromium of at most 0.08%, at most 0.006% carbon and at most 0.010% aluminum, at most 0.001% titanium and at most 0.001 niobium, iron and inevitable impurities, casting the steel in the form of a slab, hot-rolling the slab at a temperature above Ar3 to obtain a strip of hot-rolled sheet, coiling the hot-rolled sheet at a temperature between greater than 530°C to 570°C, cold-rolling a hot-rolled sheet into the form of an intermediate cold-rolled sheet,

continuously annealing the intermediate cold-rolled sheet at a temperature between 640°C and 670°C, rerolling the intermediate cold-rolled sheet down to a final sheet thickness for drawing, the process steps providing a sheet of ultra-low-carbon steel havinga Lankford coefficient r_{aver} > 1.6, a plane anisotropy coefficient (ΔC) close to 0 and a homogeneous structure with equiaxed grains. See page 4, lines 9-39; page 9, lines 8-11; page 16, lines 8-10; Table 3, page 13; page 14, lines 21-23; page 15, lines 11-15; page 17, lines 34-39 and page 18, lines 1-3 of the specification.

VI. ISSUES

The issues in this appeal are as follows: whether or not Claims 8-17, 19 and 21 are unpatentable under 35 U.S.C. §103(a) over European patent 556834A2.

VII. GROUPING OF CLAIMS

Claims 8-17, 19 and 21 do not stand or fall together. In the arguments below Appellants explain why each claim is separately patentable.

VIII. ARGUMENT

(iv). Rejection of Claims 8-17, 19 and 21 Under 35 U.S.C. §103

1. Argument applicable against the rejection of independent Claims 8 and 14.

The Examiner has characterized European patent 556834A2 as disclosing ultra-low-carbon steel sheet alloy with constituents whose weight percent ranges overlap with those of the claims. Further, the Examiner states that the steel sheet is processed in substantially the same

manner as claimed by Appellant, which includes coiling at 400-600°C and continuous annealing at a temperature above the recrystallization temperature. The Examiner states that page 11, lines 19-33 of the specification discloses that "the continuous annealing is carried out at a temperature generally 20-30°C above the recrystallization temperature of the steel...the annealing temperature is at most equal to 700°C".

It is Appellants' position that the claims distinguish over the European patent for the following reasons. In process Claims 8, 9, 13 and 19 the combination of the specific steel having specific constituents in specific amount ranges in conjunction with a specific coiling temperature range of greater than 530°C to 570°C, further in conjunction with the annealing temperature range of 640°C to 670°C distinguishes over what is shown in the European patent and it is submitted that the disclosure of the European patent is nothing more than an invitation to the worker of ordinary skill in the art to experiment with different steels, different coiling temperatures and different annealing temperatures in order to arrive at the process of the present claims. The Examiner's quotation from Appellants' specification does not necessarily indicate that the annealing temperature would be within the range of 640°C to 670°C, since the recrystallization temperature for different steels is different and the upper limit of 700°C would indicate that the annealing temperature as spoken of in the specification may actually occur above 670°C to 700°C, outside the range of the present claims. Therefore, a prima facie case of obviousness over EP 556834A2 has not been established.

Further, all of the Examples in Table 3 of EP '834 except Sample No. 3 show an annealing temperature of 700°C or higher. In Sample 3, however, the coiling temperature is at 520°C, lower than the lowest point by more than 10°C of the coiling temperature of Claim 8.

And, in Samples 10, 11, 13, 14, 16 and 18, which show a coiling temperature of greater than 530°C, the upper limit of the coiling temperature of 570°C is exceeded in Samples 10 and 13 and in all of the above-mentioned Samples the annealing temperature is higher than the upper limit on the annealing temperature of Claim 8 of 670°C. The annealing temperatures of the above-mentioned Samples run from a low 700°C to a high of 760°C. Therefore, Claim 8 and the above-mentioned process claims dependent thereon distinguish over what is shown in EP 556834A2.

Additionally,, the process of the present claims produces a sheet of steel as set forth in Claims 14 and 21, which sheet is defined as being made by the process of Claim 8 and is distinguished from the sheets made in the European patent by comparative data in the specification. The steel sheet in Claim 14 now contains the limitation of at most 0.010% aluminum and at most 0.001% titanium and 0.001% niobium. As stated on page 9, lines 8-11, in order to obtain suitable sheet recrystallization conditions, the titanium content is limited to 10 ppm at most and the niobium content is also limited to 10 ppm at most. Attached to an earlier Response is a diagram showing the temperature of the end of recrystallization of steel sheets elaborated according to the process of the invention, having different titanium contents. Figure 1 and the discussion on page 15 of the specification is directed to the investigation of the recrystallization conditions and the temperature at which recrystallization of the steels on Table 3 take place. The first three steels on Table 3 are the steels of the invention as shown on Table 1 on page 6 of the specification. It can be seen from Figure 1 that the steels of the invention all reach 100% crystallization at about 640°C, while the sheets outside the invention all show higher recrystallization temperatures. Thus, it can be seen that the steels of the instant claims

exhibit lower temperatures of complete recrystallization than steels outside the parameters of the instant claims.

Figures 2A through 2E, discussed on page 15, lines 36 through page 16, show that the steel sheets of Figures 2A and 2B, sheets according to the instant invention, show grains of a homogeneous size and equiaxed structure, while sheets of Figures 2C through 2E, outside the invention, show a grain structure of nonhomogeneous size, nonequiaxed structure and an irregular and elongate structure known by the name "pancake" structure. Thus, it can be seen that the steels of the instant claims produce a grain structure which is more homogeneous and of an equiaxed structure than steels outside the parameters of the claims.

In Figures 5A through 5C and Figure 6, which are discussed on pages 17 and 18 of the specification show various Lankford coefficients and a Lankford average coefficient, which coefficient is indicative of high standard anisotropy conducive to drawing of the steel. Figures 5A through 5C are Lankford coefficients in a longitudinal direction, the transverse direction and at 45°. Figure 6 shows the average Lankford coefficient for the entire sheet as a function of the aluminum content. Above ten thousandths of a percent aluminum the average Lankford coefficient very rapidly falls below 1.6 before stabilizing at around 1.45 in the case of the highest aluminum contents of the sheet specimens on which the tests were carried out. This indicates that steels with aluminum amounts higher than the amounts of the instant claims, will not produce steels with an average Lankford coefficient greater than 1.6.

Table 4 on page 18 of the specification gives compositions, coiling and annealing temperatures and other parameters for steels A through L, of which only steel C corresponds to the instant invention in carbon and aluminum contents, coiling and annealing temperatures. The

steels either exhibit aluminum contents greater than ten thousandths of a percent, carbon content outside the range of the instant claims or both aluminum content and carbon content outside the range of the claims or are outside the coiling temperature.

For instance, in Table 4 steels A, B, F and H are outside both carbon content, aluminum content and coiling temperature of the present claims. Steels G and I are outside of the carbon content and coiling temperature of the present claims. Steels D, E, K and L are outside only the aluminum content of the present claims and steel D is outside the coiling temperature. To reiterate steels A, B, D, F, G, H, I and J are outside the upper limit on the coiling temperature of the present claims of 570°C. Otherwise, steel J is within the carbon and aluminum contents of the present claims. It can be seen from a comparison of the results obtained in Table 4 for the Lankford coefficient, the plane anisotropy and the grain index that only steel C within the limitations of the present claims on carbon content, aluminum content and coiling temperature produces superior results in all three of the above-mentioned categories. All of the other steels are deficient in one or more of the above-mentioned categories, including steel J, outside the coiling temperature, which is deficient in grain index as compared to steel C. Thus, the comparative data shows unexpected results for the process of the present claims and the steel produced from the process of the present claims.

2. Argument Against the Rejection of Claim 9 under 35 U.S.C. §103

The general arguments set out above apply to not only independent Claim 8 but, with equal force, to dependent Claim 9. Dependent Claim 9 sets forth an annealing period of less than three minutes, a range which is not specifically shown in EP 556834A2.

3. Argument Applicable Against the Rejection of Claim 10 Under 35 U.S.C. §103

Claim 10 has limitations on the thickness of the hot-rolled sheet, the reduction ratio of the hot-rolled sheet, the annealing temperature for the sheet, the time of annealing for the sheet and the reduction ratio of the cold-rolled sheet in a skin-pass rolling mill. The reasons for the particular limitations in this claim are discussed on page 11, line 34 through page 12, line 20 and refer to different processes for producing cans. The European patent does not show the limitations of Claim 10 in the discussion of Detailed Description of the Embodiments on page 4, line 24 through page 5, line 45 and only refers to a rolling simulation on page 5, lines 22-26 in which a reduction of 70% or less is performed. Table 3 on pages 10-11 of the European patent shows all annealing conditions and skin-pass reductions are outside the parameters of Claim 10. Therefore, it is submitted that Claims 10 distinguishes over what is shown in EP 556834A2.

4. Argument Applicable Against the Rejection of Claim 11 under 35 U.S.C. §103

Claim 11 has limitations on the thickness of the hot-rolled sheet, the reduction ratio of the hot-rolled sheet, the annealing temperature for the sheet, the time of annealing for the sheet and the reduction ratio of the cold-rolled sheet in a skin-pass rolling mill. The reasons for the particular limitations in this claim are discussed on page 11, line 34 through page 12, line 20 and refer to different processes for producing cans. With regard to Claim 11 sample No. 3 shows an annealing condition of 670°C, but a time of treatment of only 10 seconds, as compared to a treatment time of 30 seconds for Claim 11, a skin-pass reduction of 8%, which is within the range of Claim 11, but is outside the reduction ratio for the hot-rolled sheet and shows a

Lankford value of under 1.6, i.e., 1.5. Therefore, it is submitted that Claim 11 distinguishes over what is shown in EP 556834A2.

5. Argument Applicable Against the Rejection of Claim 12 under 35 U.S.C. §103

EP 556834A2 does not show that the steel is killed in contact with a slag having an adjusted amount of aluminum and of alumina as in Claim 12. The significance of this limitation is discussed on page 7, line 20 through page 8, line 8 of the specification. The discussion of aluminum killed steel on page 6, lines 36-51 of EP 556834A2 does not indicate that the steel is killed by adding a mixture of aluminum and alumina to slag in order to prevent the steel from reoxidizing. Therefore, Claim 12 distinguishes over what is shown in EP 556834A2.

6. Argument Applicable Against the Rejection of Claim 13 under 35 U.S.C. §103

In addition to the fact that EP 556834A2 does not show that the steel is killed in contact with a slag having an adjusted amount of aluminum and alumina as discussed in paragraph 5, Claim 13 further adds the limitation that the steel is cast in the form of a slab in an inert-atmosphere continuous casting plant. Therefore, Claim 13 distinguishes over what is shown in EP 556834A2, also.

7. Argument Applicable Against the Rejection of Claim 15 under 35 U.S.C. §103

In addition to the fact that EP 556834A2 does not show that the steel is killed in contact with the slag having an adjusted amount of aluminum and of alumina as discussed in paragraph 5, Claim 15 further incorporates the limitations of Claim 9 which include an annealing time of

less than three minutes. Therefore, Claim 15 distinguishes over what is shown in EP 556834A2, also.

8. Argument Applicable Against the Rejection of Claim 16 under 35 U.S.C. §103

In addition to the fact that EP 556834A2 does not show that the steel is killed in contact with the slag having an adjusted amount of aluminum and of alumina as discussed in paragraph 5, Claim 16 incorporates the limitations of Claim 10, which where discussed as distinguishing over EP 556834A2 in paragraph 3. Therefore, Claim 16 distinguishes over what is shown in EP 556834A2, also.

9. Argument Applicable Against the Rejection of Claim 17 under 35 U.S.C. §103

In addition to the fact that EP 556834A2 does not show that steel is killed in contact with the slag having an adjusted amount of aluminum and of alumina as discussed in paragraph 5, Claim 17 further incorporates the limitations of Claim 11, which were discussed as distinguishing over EP 556834A2 in paragraph 4. Therefore, Claim 17 distinguishes over what is shown in EP 556834A2, also.

10. Argument Applicable Against the Rejection of Claim 19 under 35 U.S.C. §103

In addition to the arguments set forth in paragraph 1 against the rejection of Claim 8 it is further argued that Claim 19 sets forth a specific range for nitrogen which is not shown in EP 556834A2. Therefore, Claim 19 distinguishes over EP 556834A2, also.

11. Argument Against the Rejection of Claim 21 under 35 U.S.C. §103

In addition to the arguments made for patentability of Claim 14 in paragraph one it is submitted that EP 556834A2 does not show the specific plane anisotropy coefficient range set forth in Claim 21. Therefore, Claim 21 distinguishes over what is shown in EP 556834A2, also.

In view of the foregoing arguments, Appellants respectfully request that the Examiner's rejection be REVERSED.

Respectfully submitted,

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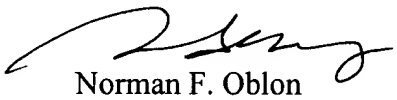

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APPENDIX I

Pending claims in U.S. Application Serial No. 09/129,238.

8. (Twice Amended) Process for producing a thin sheet of ultra-low-carbon steel, said process comprising:

-producing a killed and vacuum-degassed steel comprising, by weight, between 0.10 and 0.35% manganese, less than 0.006% nitrogen, less than 0.025% phosphorus, less than 0.020% sulphur, less than 0.020% silicon, a total amount of the elements copper, nickel and chromium of at most 0.08%, at most 0.006% carbon and at most 0.010% aluminum, iron and inevitable impurities,

-casting the steel in the form of a slab,

-hot-rolling the slab at a temperature above Ar3 to obtain a strip of hot-rolled sheet,

-coiling the hot-rolled sheet,

-cold-rolling the hot-rolled sheet into the form of an intermediate cold-rolled sheet,

continuously annealing the intermediate cold-rolled sheet at a temperature between 640°C and 670°C,

rerolling the intermediate cold-rolled sheet down to a final sheet thickness for drawing, wherein said hot-rolled sheet is coiled at a temperature between greater than 530°C to 570°C, and wherein said process provides a sheet of ultra-low-carbon steel comprising at most 0.001% titanium and at most 0.001% niobium and having a Lankford coefficient r_{aver} greater than 1.6.

9. (Amended) Process according to Claim 8, wherein the steel comprises at most 0.001% titanium by weight and at most 0.001% niobium by weight and wherein the cold-rolled sheet is annealed at a temperature 640°C and 670°C for a time of less than 3 minutes.

10. Process according to Claim 9, wherein the hot-rolled sheet has a thickness of about 2.3 mm, the hot-rolled sheet is rolled with a reduction ratio of between 85 and 89%, the cold-rolled intermediate sheet is annealed by continuous annealing at a temperature of approximately 650°C, for approximately twenty seconds, and the cold-rolled intermediate sheet is rerolled in a skin-pass rolling mill with a reduction ratio of between 23 and 31%.

11. (Amended) Process according to Claim 9, wherein the hot-rolled sheet has a thickness of about 3 mm, the hot-rolled sheet is cold rolled with a reduction ratio of 90 to 93%, the intermediate cold-rolled sheet is continuously annealed at a temperature of 670°C for a time of about thirty seconds and, after annealing, the intermediate sheet is rerolled in a skin-pass rolling mill with a reduction ratio of between 2.5 and 17%.

12. Process according to Claim 8, wherein the steel is killed in contact with a slag having an adjusted amount of aluminum and of alumina.

13. Process according to Claim 12, wherein the steel is cast in the form of a slab in a inert-atmosphere continuous casting plant.

14. (Amended) A thin sheet of ultra-low-carbon steel made by the process of Claim 8 comprising, by weight, between 0.10 and 0.35% manganese, less than 0.006% nitrogen, less than 0.025% phosphorus, less than 0.020% sulphur, less than 0.020% silicon, a total amount of the elements copper, nickel and chromium of at most 0.08%, at most 0.006% carbon and at most 0.010% aluminum, iron and inevitable impurities, wherein it has a homogeneous structure with equiaxed grains, a Lankford coefficient (r_{aver}) greater than 1.6 and a plane anisotropy coefficient (ΔC) close to 0, and wherein said sheet comprises at most 0.001% titanium and 0.001% niobium.

15. Process according to Claim 9, wherein the steel is killed in contact with a slag having an adjusted amount of aluminum and of alumina.

16. Process according to Claim 10, wherein the steel is killed in contact with a slag having an adjusted amount of aluminum and of alumina.

17. Process according to Claim 11, wherein the steel is killed in contact with a slag having an adjusted amount of aluminum and alumina.

19. The process of Claim 8, wherein said steel comprises 0.0022-0.0050% nitrogen.

21. (Amended) The thin sheet as claimed in Claim 14, wherein the plane anisotropy coefficient is 0.08-0.12.